Hawaii Wind Resource Data

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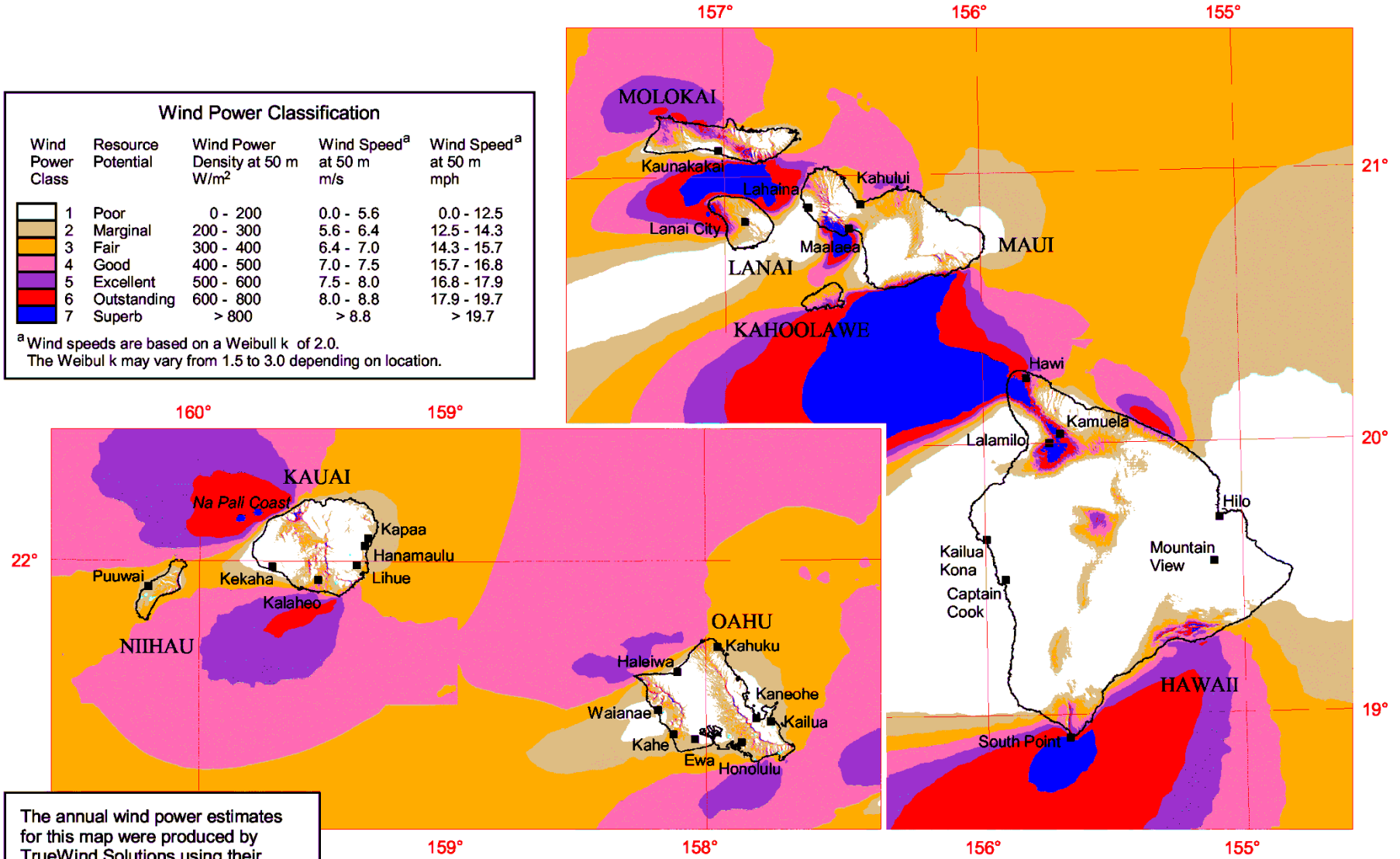
Hawaii - 50 m Wind Power



Wind Power Classification

Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m²	Wind Speed[a] at 50 m m/s	Wind Speed[a] at 50 m mph
1	Poor	0 - 200	0.0 - 5.6	0.0 - 12.5
2	Marginal	200 - 300	5.6 - 6.4	12.5 - 14.3
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8
5	Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
6	Outstanding	600 - 800	8.0 - 8.8	17.9 - 19.7
7	Superb	> 800	> 8.8	> 19.7

[a] Wind speeds are based on a Weibull k of 2.0.
The Weibul k may vary from 1.5 to 3.0 depending on location.

The annual wind power estimates for this map were produced by TrueWind Solutions using their Mesomap system and historical weather data. It has been validated with available surface data by NREL and wind energy meteorological consultants.

NREL

U.S. Department of Energy
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12-JUL-2005 2.1.5

Validated 50 m Wind Resource Map

- Wind resource on map represents long-term estimates of wind resource
- NREL validated preliminary estimates using 66 measurement locations
  - Measurement locations included present and past measurement sites
- Major high wind resource areas are present on maps
- Some local acceleration areas that are caused by terrain probably not depicted on map

AWS Truewind Wind Integration Modeling

- AWS Truewind simulated the years 2007-2008
  - Horizontal grid resolution is 1 km
  - Produced wind speed and power production every 10 minutes
  - 500 + potential turbine locations selected amalgamated into 27 wind plant sites
- AWS Truewind modified wind speeds on Lanai for final model data set based on on-site proprietary measurement data

NREL Validation Analyses

- Comparison of 2007-08 model average wind speeds with average wind speed from validated Hawaii wind map
  - 500 + turbine locations versus nearest grid point from validated map
- Model diurnal profiles
  - Wind Speed
    - Selected individual turbine locations
    - 27 wind plants as a whole
- Model ramp rates
  - Distribution and frequency
    - At each wind plant site
    - Average for all 27 wind sites

NREL Validation Analyses (cont)

- Conclusions
  - Average wind speeds at large majority of turbine locations within 0.5 m/s of average wind speeds from grid cells from validated map
    - General good agreement between recent model data and validated map- Lanai adjustments should not change overall evaluation
  - Analysis of diurnal patterns and ramp rates revealed no unusual patterns
  - No evidence found that would prevent model data from being used for Hawaii system integration studies
- A gridded model data set will eventually be available on web site